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Technology commercialization strategy selection: Analytical network process approach

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Abstract

The goal of technology commercialization is to transform technology innovation into product or service which has market value. Selecting an appropriate technology commercialization strategy is essential to the success of creating the commercial benefits. However, selecting a suitable technology commercialization strategy for a company is difficult, and involves numerous complex considerations. Resource-based view suggests that internal and external sources, derived from human or technical assets and resources, can determine success of technology commercialization. Specifically, technology commercialization strategy decision involves two key components, namely, technology strategy and technology competence, and interdependence exists between the two components. Technology commercialization strategy selection is modeled as a multi-criteria decision making problem. The decision makers should select the technology commercialization strategies which best match the needs of the technology strategy and technology competence by contemporaneously considering multiple and interdependent evaluation criteria to ensure success. Owing to the complex nature of technology commercialization strategy selection, the selection decision represents a dilemma in that its solution depends on human judgment, yet the problem is too complex to be solved by human judgment alone. Thus, an effective decision support model specifically for dealing with interdependence among criteria must be developed. Based on the resource-based theory, this study develops a systematic decision support model for selecting technology commercialization strategy. This study describes the technology strategies, as well as the technology competences and the corresponding sub-criteria used to evaluate technology commercialization

strategy. Furthermore, the analytic network process is adopted to deal with the interdependence among criteria of different layers in the analysis process for selecting a suitable technology commercialization strategy. Additionally, an empirically comparison investigation for two companies demonstrates the computational process and effectiveness of the proposed model, which attempts to improve the quality of decision making. The investigation obtains data by administering the questionnaires to the committees of decision makers with sufficient experience to participate in the technology commercialization strategy decisions of the two companies. The weighting factor for each criterion and sub-criterion can be calculated using the proposed decision model. The decision makers apply each measure to assess the technology commercialization strategies. Technology commercialization strategy is determined by choosing the strategy with the highest desirability index following the synthesis evaluation. The important findings of this study are concluded as follows. (1) According to the investigated results, the decision model is decomposed into two layers, namely, the technology strategies and the criteria of technology competences used for evaluating commercialization alternatives. Technology strategy is divided into four dimensions, namely, radicality, R&D spending, external resources, and patenting. The technology competence is composed of five dimensions, namely, experience capability, budget capability, equipment capability, output capability, and management capability. The decision model is used to measure the relative importance of criteria after taking the interdependence between the technology strategy and technology competence into consideration. The decision model can efficiently grasp the actual decision making conditions and express the validity and reliability of evaluation criteria. The invention of decision model can help decision makers deliberate and realign their technology strategy and technology commercialization strategy. (2) For case company M, a mechanical manufacturing company, its technology strategy emphasizes patenting and R&D spending. The core competence of company M consists of management capability and output capability. For case company E, an electronic company, the budget capability is the core competence and the company's technology strategy focuses on the ratio of radical technology. The technology commercialization strategy with higher desirability index calculated by the decision model can meet the company's needs. Finally, the research results are verified by the decision

making committees and the top executives of these two companies, who strongly agree that the results provide a valuable reference for technology commercialization strategy selection. Moreover, the decision model is recommended as a useful tool for technology commercialization management.

Key words: Technology commercialization; Technology strategy;
Technology competence